

1512 S BATAVIA AVENUE
GENEVA, IL 60134
630-232-0104

An ALION Technical Center

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FOUNDED 1918 BY
WALLACE CLEMENT SABINE

Test Report

SPONSOR: **United Plastics Corporation**
Mount Airy, NC

Sound Transmission Loss
RAL™-TL21-013

CONDUCTED: 2021-01-13

Page 1 of 12

ON: Insulated 3.625 in. steel stud wall - 2 layers gypsum board with interstitial dB Renovate on source side, 1 layer gypsum board on receive side

TEST METHODOLOGY

Riverbank Acoustical Laboratories™ is accredited by the U.S. Department of Commerce, National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP) as an ISO 17025:2017 Laboratory (NVLAP Lab Code: 100227-0) and for this test procedure. The test reported in this document conformed explicitly with ASTM E90-09 (2016): "Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements." The single number rating of the specimen was calculated according to ASTM E413-16: "Classification for Rating Sound Insulation." A description of the measurement procedure and room specifications is available upon request. The transmission loss values are for a single direction of measurement. The results presented in this report apply to the sample as received from the test sponsor.

INFORMATION PROVIDED BY SPONSOR

The test specimen was designated by the sponsor as Insulated 3.625 in. steel stud wall - 2 layers gypsum board with interstitial dB Renovate on source side, 1 layer gypsum board on receive side. The following nominal product information was provided by the sponsor prior to testing. The accuracy of such sponsor-provided information can affect the validity of the test results.

Product Under Test

Trade Name: dB Renovate
Material: Polyester fiber adhered to thin polymer film
Manufacturer: United Plastics Corporation

SPECIMEN MEASUREMENTS & TEST CONDITIONS

The building contractor (Seth Priser) and RAL staff compiled a detailed construction specification as follows, in order of installation:

Plates / Base Track

Material: Nominal 25g EQ steel track
Nominal Yield Strength: 345 MPa (50 ksi)
Dimensions: 2445 mm (96.25 in.) long by 32 mm (1.25 in.) high
Depth: 92 mm (3.625 in.)
Steel Thickness: 0.41 mm (0.016 in.)
Installation: Friction fit over foam sill sealer
Overall Weight: 2.49 kg (5.5 lbs)
Mass per Unit Length: 0.51 kg/m (0.34 lbs/ft)



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Test Report

United Plastics Corporation
2021-01-13

RAL™-TL21-013

Page 2 of 12

Studs

Material: Nominal 25g EQ steel studs
Nominal Yield Strength: 345 MPa (50 ksi)
Dimensions: 5 @ 32 mm (1.25 in.) wide by 2743 mm (108 in.) high
Depth: 92 mm (3.625 in.)
Steel Thickness: 0.41 mm (0.016 in.)
Stud Spacing: 610 mm (24 in.) on center
Installation: Crimped to tracks at top and bottom, two (2) crimps per joint
Side studs fastened to sides of test frame at midpoint
Fasteners: Type W bugle head drywall screws, length @ 76.2 mm (3 in.)
Two (2) fasteners total
Overall Weight: 6.46 kg (14.25 lbs)
Mass per Unit Length: 2.93 kg/m (1.97 lbs/ft)

Note: A bead of acoustical sealant was used to seal both sides of the specimen where framing members met the test frame (0.68 kg (1.5 lbs) total).

Source Side

Layer 1

Material: Type X gypsum board
Dimensions: 1 @ 1219 mm (48 in.) x 2743 mm (108 in.)
2 @ 610 mm (24 in.) by 2743 mm (108 in.)
Thickness: 15.9 mm (0.625 in.)
Installation: Screwed to studs
Fasteners: Type S bugle head drywall screws, length @ 32 mm (1.25 in.)
Fastener Spacing: 406 mm (16 in.) on center
Overall Weight: 73.03 kg (161 lbs)
Mass per Unit Area: 10.92 kg/m² (2.24 lbs/ft²)

Layer 2

Material: Product under test (dB Renovate); bonded fibers adhered to thin polymer film
Dimensions: 2 @ 1118 mm (44 in.) x 2743 mm (108 in.)
Thickness: Approximately 6.35 mm (0.25 in.)
Installation: Stapled to Layer 1, joints butted and covered with tape
Polymer film facing outward
Fasteners: T-50 staples, leg length @ 14.3 mm (0.56 in.)
Fastener Spacing: Stapled at upper corners
1117.6 mm (44 in.) wide pieces have extra staples at midpoints of left and right edge
Overall Weight: 4.31 kg (9.5 lbs)
Mass per Unit Area: 0.64 kg/m² (0.13 lbs/ft²)



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Test Report

United Plastics Corporation
2021-01-13

RAL™-TL21-013

Page 3 of 12

Source Side (continued)

Layer 3

Material: Type X gypsum board
Dimensions: 2 @ 1219 mm (48 in.) x 2743 mm (108 in.)
Thickness: 16 mm (0.625 in.)
Installation: Fastened through Layers 1 and 2 to studs
Fasteners: Type S bugle head drywall screws, length @ 51 mm (2 in.)
Fastener Spacing: 406.4 mm (16 in.)
Overall Weight: 73.26 kg (161.5 lbs)
Mass per Unit Area: 10.95 kg/m² (2.24 lbs/ft²)

Insulation

Materials: R-13 unfaced fiberglass batt insulation
Dimensions: 4 @ 610 mm (24 in.) x 2438 mm (96 in.)
Thickness: 89 mm (3.5 in.)
Installation: Friction fit in cavities between studs
Overall Weight: 9.07 kg (20 lbs)
Density: 17.16 kg/m³ (1.07 lbs/ft³)

Receive Side

Materials: Type X gypsum board
Dimensions: 2 @ 1219 mm (48 in.) by 2743 mm (108 in.)
Thickness: 15.9 mm (0.625 in.)
Installation: Fastened to studs
Fasteners: Type S bugle head drywall screws, length @ 32 mm (1.25 in.)
Fastener Spacing: 406 mm (16 in.) on center
Overall Weight: 72.8 kg (160.5 lbs)
Mass per Unit Area: 10.88 kg/m² (2.23 lbs/ft²)

Note: Joints and screw heads on all gypsum board layers were treated with a thin bead of acoustical sealant and metal tape (0.68 kg (1.5 lbs) total).



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Test Report

United Plastics Corporation
2021-01-13

RAL™-TL21-013

Page 4 of 12

Overall Specimen Measurements

Dimensions: 2.44 m (96.0 in) wide by 2.74 m (108.0 in) high
Thickness: 0.15 m (5.75 in)
Weight: 242.79 kg (535.25 lbs)
Transmission Area: 6.689 m² (72 ft²)
Mass per Unit Area: 36.3 kg/m² (7.43 lbs/ft²)

Test Aperture

Size: 2.74 m (9.0 ft.) by 4.27 m (14.0 ft.)
Filler Wall: Yes
Sealed: Entire periphery (both sides) with dense mastic

Test Environment

Source Room

Volume: 177.11 m³
Temperature: 21.1 °C ± 0.0 °C
Relative Humidity: 48.5 % ± 1.0 %

Receive Room

Volume: 178.33 m³
Temperature: 21.1 °C ± 0.0 °C
Relative Humidity: 48.0 % ± 0.0 %

Requirements

Temperature: 22° C +/- 2° C, not more than 3° C change over all tests.
Relative Humidity: ≥ 30%, not more than +/- 3% change over all tests.

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Test Report

RAL™-TL21-013

Page 5 of 12

United Plastics Corporation
2021-01-13



Figure 1 – Specimen mounted in test opening, as viewed from source room



Figure 2 – Specimen mounted in test opening, as viewed from receive room

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Test Report

United Plastics Corporation
2021-01-13

RAL™-TL21-013

Page 6 of 12



Figure 3 – Installation and sealing of steel framing members



Figure 4 – Insulation installed

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Test Report

RAL™-TL21-013

Page 7 of 12

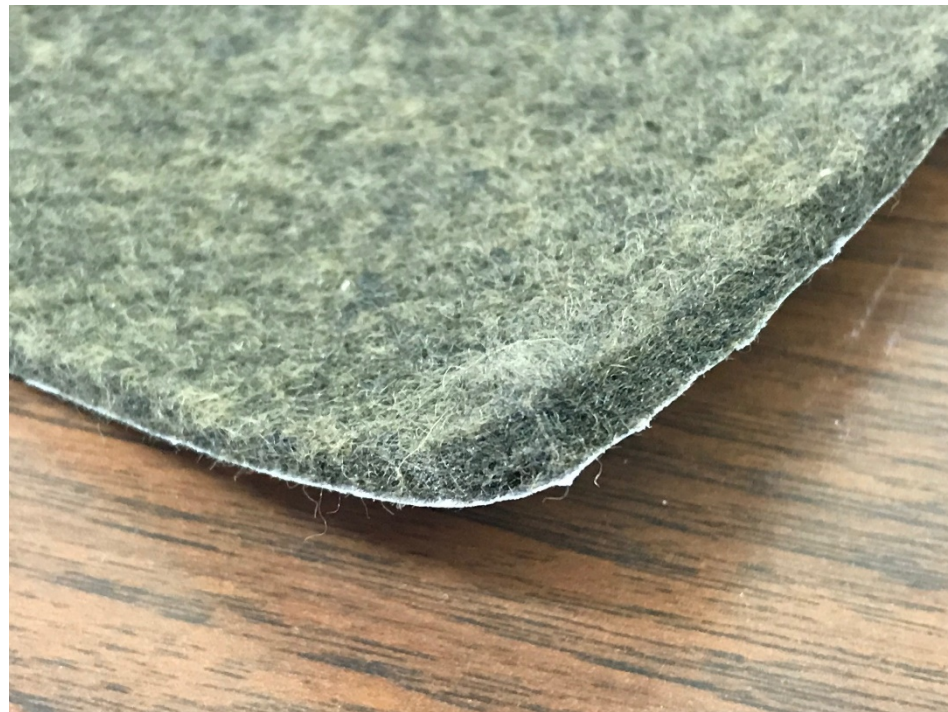


Figure 5 – Cross section of product under test



Figure 6 – Product under test partially installed, as viewed from source room

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Test Report

FOUNDED 1918 BY
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United Plastics Corporation
 2021-01-13

RAL™-TL21-013

Page 8 of 12

TEST RESULTS


Sound transmission loss values are tabulated at the eighteen standard frequency bands. A graphic presentation of the data and additional information appear on the following pages. The precision of the transmission loss test data is within the limits set by the ASTM Standard E90-09 (2016). See Appendix A for identification of corrections applied to the reported data.

<u>FREQ.</u>	<u>TL</u>	<u>ΔTL</u>	<u>DEF.</u>	<u>FREQ.</u>	<u>TL</u>	<u>ΔTL</u>	<u>DEF.</u>
100	25	0.63	0	800	54	0.12	1
125	35	0.59	2	1000	58	0.10	0
160	38	0.44	2	1250	62	0.16	0
200	42	0.57	1	1600	60	0.09	0
250	44	0.34	2	2000	51	0.11	6
315	48	0.29	1	2500	52	0.06	5
400	50	0.18	2	3150	58	0.05	0
500	52	0.14	1	4000	65	0.08	0
630	52	0.15	2	5000	70	0.08	0

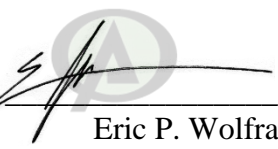
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ABBREVIATION INDEX

- FREQ. = 1/3 OCTAVE BAND CENTER FREQUENCY, Hz
- TL = TRANSMISSION LOSS, dB
- ΔTL = 95% CONFIDENCE INTERVAL FOR TL MEASUREMENTS, dB
- DEF. = DEFICIENCIES, dB BELOW SHIFTED STC CONTOUR (SUM OF DEF = 25)
- STC = SOUND TRANSMISSION CLASS

Tested by 
 Dean Victor
 Lead Experimentalist

Report by 
 Malcolm Kelly
 Test Engineer, Acoustician

Approved by 
 Eric P. Wolfram
 Laboratory Manager



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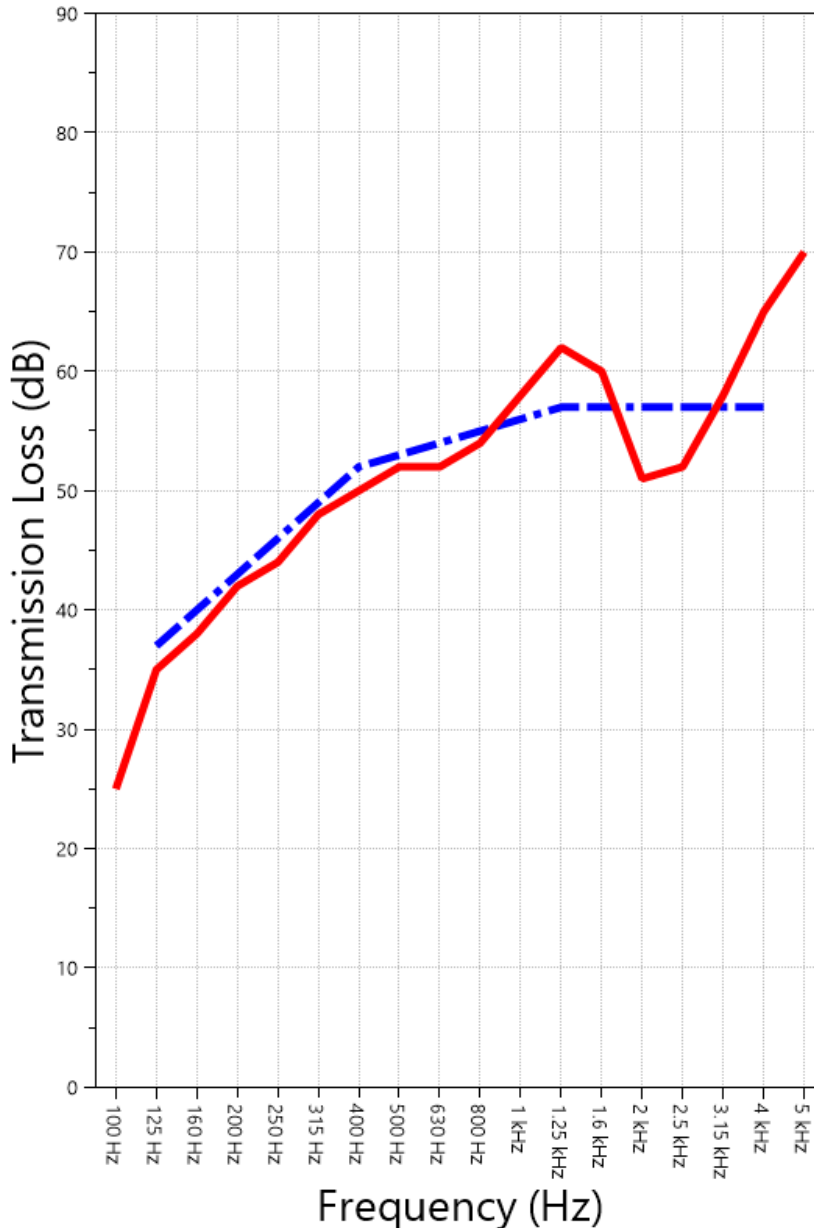
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 2021-01-13

RAL™-TL21-013

Page 9 of 12

SOUND TRANSMISSION REPORT

Insulated 3.625 in. steel stud wall - 2 layers gypsum board with interstitial dB Renovate on source side, 1 layer gypsum board on receive side



STC=53



TRANSMISSION LOSS
SOUND TRANSMISSION CLASS CONTOUR



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Test Report

United Plastics Corporation
2021-01-13

RAL™-TL21-013

Page 10 of 12

APPENDIX A: Extended Frequency Range Data

Specimen: Insulated 3.625 in. steel stud wall - 2 layers gypsum board with interstitial dB Renovate on source side, 1 layer gypsum board on receive side (See Full Report)

The following non-accredited data were obtained in accordance with ASTM E90-09 (2016), but extend beyond the defined frequency range of 100Hz to 5,000Hz. These unofficial results are representative of the RAL test environment only and intended for research & comparison purposes. Sampling precision observed during this procedure is reported below. Corrections are detailed in Appendix B.

1/3 Octave Band Center Frequency (Hz)	Sound Transmission Loss (dB)	Applicable Corrections	Δ TL (Eq. A2.5) (dB)	Repeatability (dB)
31.5	21	ZZ F	1.03	1.01
40	25	Z F	0.71	2.26
50	16		1.06	1.52
63	12		0.47	1.47
80	16		0.76	0.60
100	25		0.63	0.67
125	35		0.59	0.71
160	38		0.44	0.35
200	42	Z F	0.57	0.33
250	44		0.34	0.42
315	48		0.29	0.41
400	50		0.18	0.46
500	52		0.14	0.18
630	52		0.15	0.26
800	54		0.12	0.24
1000	58		0.10	0.27
1250	62		0.16	0.15
1600	60		0.09	0.12
2000	51		0.11	0.13
2500	52		0.06	0.19
3150	58		0.05	0.14
4000	65		0.08	0.17
5000	70	Z	0.08	0.17
6300	72	Z F	0.15	0.21
8000	69	Z F	0.18	0.50
10000	61	Z F	0.26	1.21
12500	56	Z F	0.33	1.74



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Test Report

United Plastics Corporation
2021-01-13

RAL™-TL21-013
Page 11 of 12

APPENDIX B: Glossary of Standardized Corrections and Adjustments

Specimen: Insulated 3.625 in. steel stud wall - 2 layers gypsum board with interstitial dB Renovate on source side, 1 layer gypsum board on receive side (See Full Report)

Mark Interpretation

- A** Measured sound pressure levels in the receive room are within 10 dB of the ambient noise level at the marked frequency band. Receive room levels used to calculate Transmission Loss are corrected according to ASTM E90 Section 10.3.
- AA** Measured sound pressure levels in the receive room are within 5 dB of the ambient noise level at the marked frequency band. Receive room levels used to calculate Transmission Loss are corrected according to ASTM E90 Section 10.3.1. Transmission Loss values calculated from levels corrected this way will be less than or equal to Transmission Loss values from a hypothetical test using the same specimen and a receive room with idealized ambient sound levels of $(-\infty)$ dB.
- F** The reported Transmission Loss is within 10 dB of the laboratory flanking limit at the marked frequency band. The measured performance of the specimen may be limited by the performance of the laboratory building structure at this frequency band.
- Z** The reported Transmission Loss at the marked frequency band has been corrected according to ASTM E90 Section A3.2.7 to account for possible sound transmission through the filler assembly.
- ZZ** The reported Transmission Loss at the marked frequency band has been corrected according to ASTM E90 Section A3.2.8 to account for possible sound transmission through the filler assembly. Transmission Loss values corrected this way will be less than or equal to Transmission Loss values from a hypothetical test using the same specimen and an idealized filler assembly with a Sound Transmission Class rating of (∞) .

APPENDIX C: Glossary of Variability Metrics

Specimen: Insulated 3.625 in. steel stud wall - 2 layers gypsum board with interstitial dB Renovate on source side, 1 layer gypsum board on receive side (See Full Report)

Δ TL, the 95% confidence interval for reported transmission loss values, is calculated from the standard deviation of the sets of measurements for source room sound pressure level, receive room sound pressure level, and receive room sound absorption. This metric is calculated in an effort to quantify the combined influences of room geometry, microphone positioning, and other varying environmental conditions on reported results.

Repeatability, expressed as a 95% confidence interval, is calculated from the standard deviation of transmission loss as obtained from a set of six (6) consecutive tests conducted according to this test method by RAL on 2020-02-13. The tests were performed on a specimen composed of 24 gauge steel paneling, using the same test opening as used in this report. This metric provides an estimate of the variation in results that might be observed if the test were repeated with no change to the installed specimen. Note that repeatability will vary with the construction type.

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2021-01-13

RAL™-TL21-013
Page 12 of 12

APPENDIX D: Instruments of Traceability

Specimen: Insulated 3.625 in. steel stud wall - 2 layers gypsum board with interstitial dB Renovate on source side, 1 layer gypsum board on receive side (See Full Report)

<u>Description</u>	<u>Model</u>	<u>Serial Number</u>	<u>Date of Certification</u>	<u>Calibration Due</u>
System 2	Type 3160-A-042	3160-106974	2020-08-13	2021-08-13
Bruel & Kjaer Mic And Preamp C	Type 4943-B-001	2311439	2020-04-07	2021-04-07
Bruel & Kjaer Pistonphone	Type 4228	2781248	2020-08-12	2021-08-12
EXTECH Hygro 662	SD700	A083662	2020-12-18	2021-12-18
EXTECH Hygro 663	SD700	A083663	2020-12-18	2021-12-18

APPENDIX E: Revisions to Original Test Report

Specimen: Insulated 3.625 in. steel stud wall - 2 layers gypsum board with interstitial dB Renovate on source side, 1 layer gypsum board on receive side (See Full Report)

<u>Date</u>	<u>Revision</u>
2021-01-19	Original report issued

END